

**ECOL182R INTRODUCTORY BIOLOGY**  
**SCHAFFER, BONINE, FERRIERE**  
**MIDTERM TWO**  
**02 April 2009**

**STUDENT NAME:** \_\_\_\_\_  
Please Print:                      LAST Name                      FIRST Name

**PLEASE USE A NUMBER TWO PENCIL, NO PEN!**

**Choose the single best answer. Questions are worth 2 points each. Note that you can earn up to 110 points if you also answer the BONUS questions correctly.**

1. **Most fungi are**
  - a. lichens
  - b. predatory
  - c. monoecious
  - d. saprobes
  - e. flagellated
2. **A situation in which two haploid cells fuse, but their nuclei do not, is**
  - a. rather common in fungi
  - b. called a dikaryotic life stage
  - c. called fission
  - d. called sex
  - e. two of the above are correct
3. **The hyphae of fungi**
  - a. are only found in mushrooms
  - b. increase surface area to increase absorption of nutrients and water
  - c. are photosynthetic
  - d. do not contain chitin or a plasma membrane
4. **Which fungal phylum has flagella and swimming sperm and is linked to amphibian die-offs?**
  - a. Ascomycetes
  - b. Chytrids
  - c. Zygomycetes
  - d. Glomeromycetes
  - e. Basidiomycetes
5. **Which of these is NOT one of the three domains of life?**
  - a. Prokaryotes
  - b. Eukaryotes
  - c. Bacteria
  - d. Archaea
6. **Sexual reproduction typically involves \_\_\_\_\_ which produces \_\_\_\_\_ from diploids.**
  - a. mitosis, dikaryotes
  - b. mitosis, haploids
  - c. meiosis, haploids
  - d. mitosis, sporophytes
  - e. abiogenesis, gametes
7. **Mycorrhizae are mutualisms between \_\_\_\_\_ and fungi.**
  - a. algae
  - b. plants
  - c. lichen
  - d. animals
  - e. bacteria

8. **The most recent common ancestor of both fungi and plants lived about**
- 4 billion years ago
  - 450 million years ago
  - 2 billion years ago
  - 1 billion years ago
  - 225 million years ago
9. **Which of the following is NOT shared by all three domains of life?**
- glycolysis
  - mitochondria
  - semiconservative DNA replication
  - polypeptides produced by transcription and translation
10. **Which of the following is NOT typical of the prokaryotes?**
- circular chromosomes
  - nucleus
  - fission
  - metabolic diversity
11. **Which of the following is TRUE about a chemolithotroph?**
- energy from oxidizing inorganic substances, carbon from simple molecules like CO<sub>2</sub>
  - energy from oxidizing inorganic substances, carbon from other organisms
  - energy from light, carbon from other organisms
  - energy from other organisms, carbon from simple molecules like CO<sub>2</sub>
12. **Which of the following is FALSE about prokaryote biology?**
- oxygen is toxic to obligate anaerobes
  - some prokaryotes evolved photosynthesis and added oxygen to the atmosphere
  - a peptidoglycan cell wall is not found in eukaryotes
  - plants depend on prokaryotic nitrogen fixers
  - most bacteria are pathogenic (cause illness) to humans
13. **Which of the following BEST describes protists**
- monophyletic group closely related to bacteria
  - monophyletic group closely related to prokaryotes
  - eukaryotes that are not animals, plants, or fungi
  - along with bacteria and archaea, they are the sister group to eukaryotes
  - they evolved via an endosymbiosis event involving two different bacteria lineages
14. **Which of these is NOT an important characteristic of eukaryotes that helps separate them from non-eukaryotes?**
- nuclear membrane
  - cytoskeleton
  - flexible cell surface
  - acquisition of endosymbionts
  - plasma membrane
15. **Which of these statements is TRUE about endosymbiosis?**
- Endosymbiosis is how eukaryotes acquired a unicellular protist that became the mitochondria.
  - Endosymbiosis often leads to intracellular organelles with one or no plasma membrane
  - Endosymbiosis is how eukaryotes acquired a unicellular cyanobacteria that became the chloroplast.
  - Endosymbiosis necessitated the evolution of sexual reproduction.
  - Endosymbiosis necessitated the evolution of diplontic life cycles.

- 16. Some dinoflagellates produce bioluminescence and some plants produce pheromones. How can these two phenomena be explained?**
- Bioluminescence and pheromones are the same except that pheromones is what we call bioluminescence working in air instead of water.
  - Both are byproducts of photosynthesis.
  - Both are the result of symbiotic relationships with prokaryotic bacteria.
  - Both can attract a secondary predator that will attack the predator of the dinoflagellate or the plant.
  - Pheromones are produced by plants that acquired bioluminescent dinoflagellates via endosymbiosis.
- 17. The earliest land plants**
- were vascular
  - were seed plants
  - were diplontic
  - were ferns
  - include organisms similar to mosses
- 18. Which of the following was NOT an adaptation related to being on land?**
- photosynthesis for energy production
  - cuticle to retard water loss
  - gametangia enclosing gametes
  - sporopollenin to protect spores
  - mutualistic relationship with fungi for nutrient uptake
- 19. Which trait evolved FIRST in a group of algae that went on to become the plants?**
- tracheids
  - embryo protected by tissues of the parent plant
  - megaphylls and/or microphylls
  - xylem
  - seeds
- 20. A species with separate male and female flowers on the same individual plant is**
- haplontic
  - an angiosperm
  - monoecious
  - two of the above
  - all of the above
- 21. Which of these was NOT one of the four major challenges to early land plants?**
- herbivory (predation) by mammalian ungulates (like cows and deer)
  - desiccation (drying out)
  - support to fight gravity
  - dispersal of gametes
  - transporting water to all parts of the plant
- 22. What happened during evolution from the earliest land plants to ferns and then to angiosperms?**
- Plants went from being haplontic to true alternation of generations to predominantly diplontic.
  - Mosses and liverworts went extinct and were replaced by ferns which were then replaced by the rest of the non-vascular plants.
  - At some point sexual reproduction no longer relied on free-swimming sperm.
  - two of the above.
  - all of the above.

- 23. Which of these plant traits evolved most recently?**
- apical growth
  - tracheids
  - seeds
  - flowers**
  - protected embryos
- 24. Useful traits for distinguishing eudicots from monocots include all of the following EXCEPT**
- pattern of leaf veins
  - number of flower parts
  - presence or absence of free-swimming sperm**
  - arrangement of vascular bundles in the stem
  - number of cotyledons
- 25. Which of these is an example of phenotypic plasticity?**
- many cacti have CAM photosynthesis to reduce water loss
  - tree is taller with fewer side branches if growing amongst many other trees, but shorter and broader if growing alone**
  - ocotillos that make green leaves are more fit than ocotillos that make red leaves
  - The 'R' allele will code for red flowers and the 'r' allele for white flowers. If a plant has one of each allele it will produce pink flowers.
- 26. Which of these plants typically has the deepest roots**
- saguaro
  - mesquite**
  - ocotillo
  - buffel grass
  - coconut palm
- 27. Wood consists primarily of...**
- bark
  - secondary xylem**
  - secondary phloem
  - cork
- 28. Stomata open to allow \_\_\_\_\_ in for photosynthesis, but also allow for \_\_\_\_\_ loss via evapotranspiration.**
- parasitoids, oxygen
  - oxygen, water
  - carbon dioxide, water**
  - oxygen, carbon dioxide
  - light, water
- 29. Carnivorous plants are adapted to compensate for soil that has relatively low \_\_\_\_\_ content.**
- carbon
  - nitrogen**
  - calcium
  - water
- 30. Most of the mass that makes up the organic material of a plant comes from...**
- water
  - soil minerals
  - CO<sub>2</sub>**
  - nitrogen
  - potassium

- 31. When an external stimulus is converted into a form of information that cells in organisms can “understand” we call this process**
- signal transduction
  - homeostasis
  - phosphorylation
  - phototropism
  - gravitropism
- 32. Which of the following is TRUE about the phototropic response?**
- Green light stimulates auxin production and red light degrades auxin
  - Abscisic acid (ABA) initiates cell elongation
  - Any wavelength of light will stimulate the phototropic response
  - The cells that sense the light are not the same cells that respond by elongating
- 33. Which hormone is NOT correctly paired with its function?**
- cytokinins- initiate senescence
  - gibberellins- stimulate seed and bud germination
  - abscisic acid- promotes seed and bud dormancy
  - ethylene- important during senescence and fruit ripening
- 34. The primary role of most secondary metabolites in plants is**
- to provide food for pollinators
  - to regulate homeostasis and cellular function
  - to discourage herbivory
  - to attract parasitoids
- 35. Which of these is an example of an imperfect flower?**
- one that lacks sepals
  - one that has only two carpels
  - one that cannot self-pollinate
  - one that has stamens and no pistils
- 36. The two key components of sexual reproduction are**
- mitosis and formation of a blastula
  - meiosis and sperm
  - meiosis and fertilization
  - mitosis and egg
- 37. Endosperm is \_\_\_\_\_ and provides nutrition for the \_\_\_\_\_.**
- mature, gametophyte
  - haploid, pollen
  - diploid, gametophyte
  - triploid, sporophyte
- 38. Which of these is NOT a likely explanation for the evolution of seed dormancy?**
- dormancy prevents seed germination while the seed is on the parent plant
  - dormancy allows seeds to wait to germinate until environmental conditions are appropriate for seedling growth
  - seeds are dormant until they expel enough oxygen to trigger cellular division
  - dormancy allows one plant to leave offspring that can germinate in different years
- 39. Which of these plant nutrients is essential but often limiting to plant growth?**
- carbon
  - hydrogen
  - oxygen
  - nitrogen
  - all of the above

40. Different nutrients are acquired from the soil by root cells in different ways. Often, protons are exchanged for \_\_\_\_\_ while \_\_\_\_\_ are cotransported with protons back into the root cell.

- a. micronutrients, macronutrients
- b. cations, anions
- c. anions, cations
- d. anions, fungi
- e. small bacteria, micronutrients

41. Which of these terms best describes how water is moved from the soil to the leaves at the tops of very tall trees?

- a. osmotic potential
- b. root pressure
- c. capillary action
- d. cohesion-tension
- e. none of the above

42. What do we call resources or processes that humans value which are performed by species, communities, and/or ecosystems?

- a. ecosystem services
- b. goods
- c. medicine
- d. primary production
- e. food

43. What is the term biologists use to describe the ecological and evolutionary process whereby one species becomes many species in a fairly short period of time?

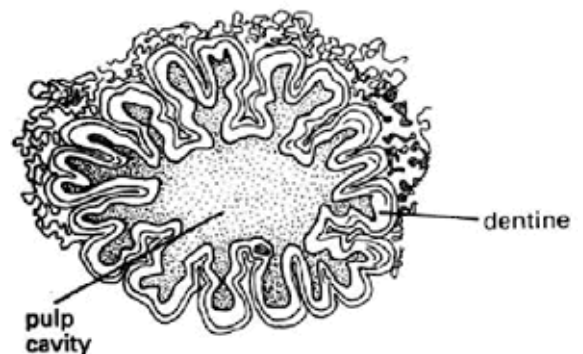
- a. mass extinction
- b. adaptive radiation
- c. metapopulation dynamics
- d. natural selection
- e. invasionary release

44. Of the following, the biggest threat to biodiversity around the world is

- a. habitat loss and/or modification
- b. disease and/or parasites
- c. invasive competitors and/or predators
- d. overharvesting and/or overconsumption
- e. mutation and/or polyploidy

45. The accompanying figure is a diagram of a fossil tooth in transverse (top cut off) section. In which of the following extinct groups would you expect to find such teeth?

- a. Crossopterygian fish.
- b. Labyrinthodont amphibians.
- c. Cotylosaurs (stem reptiles).
- d. a and b.
- e. a., b. and c.



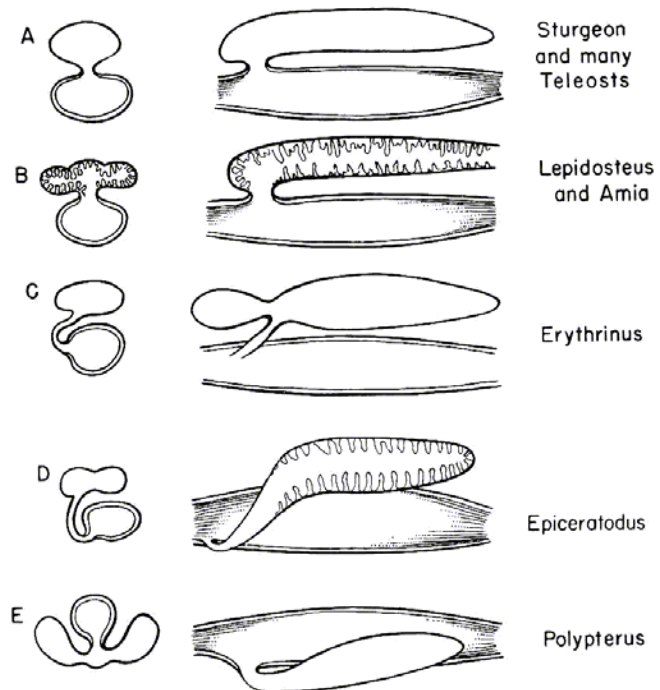
46. Reptiles (a paraphyletic group) can be broken down into four groups on the basis of the number and placement of

- a. limb bones.
- b. middle ear ossicles (incus, malleus, stapes).
- c. temporal fossae (openings in the side of the skull).
- d. tooth-bearing bones in the lower jaw.
- e. None of the above.

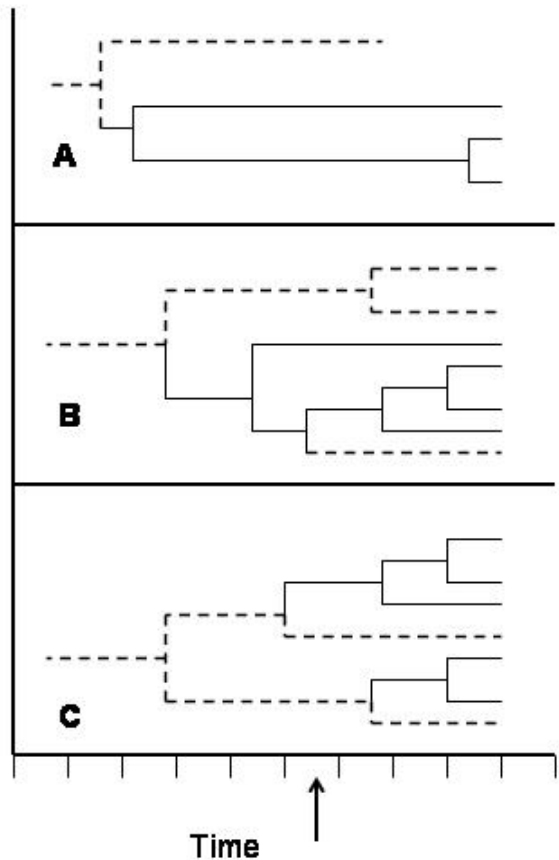
47. Key(s) to a fully terrestrial existence in vertebrates was (were) the evolution of
- alveolar lungs.
  - amniote egg.
  - water impermeable integument.
  - a and b.
  - b. and c.
48. The denticles (sharp spikes) in sharks' skin are thought to be evolutionary remnants of the external bony armor of their \_\_\_\_\_ ancestors.
- Crossopterygian
  - Holostean
  - Labyrinthodont
  - Placoderm
  - Teleost
49. True or False. Dinosaurs and mammals first appear at about the same time (late Triassic) in the fossil record.
- True.
  - False.
50. Which of the following characters arguably allowed for more active life styles in both dinosaurs and mammals?
- Bipedalism.
  - Hypertrophy of the coronoid process and the muscles attached thereto.
  - Septate lungs and air sacs.
  - Specialization of the teeth into incisors, canines, premolars and molars.
  - Upright posture with the legs below the body.

**Bonus Questions.**

51. The air bladders / lungs of five living fish species are shown in the accompanying diagram. Both the bladder's morphology and its connection to the throat (pharynx) vary. Which condition most likely resembled that of primitive actinopterygians?  
**xxE.**



52-53. The figure to the right illustrates three different hypotheses (A, B, and C) about colonization and subsequent speciation in the Galapagos Islands. The far right of the figure is the present, the far left is the distant past. The arrow on the x-axis indicates the age of the oldest Galapagos islands currently present in the Pacific Ocean. The solid lines indicate phylogenetic relationships among Galapagos species. The dashed lines indicate relationships of Galapagos taxa to mainland South America taxa.



52. Which of the three hypotheses best corresponds to taxa like rodents, geckos, and lava lizards that have colonized the Galapagos more than once.

- Figure A
- Figure B
- Figure C
- All of the above

53. In the Galapagos, marine iguanas and land iguanas are each other's closest relatives; in fact they share a common ancestor that lived longer ago than the time indicated by the arrow on the x-axis. How can this be the case if marine iguanas and land iguanas diverged AFTER their common ancestor had emigrated from South America?

- their ancestor(s) colonized the Galapagos more than once from South America
- the common ancestor initially colonized a Galapagos island that no longer exists
- their ancestor went extinct and then reappeared via hybridization in the Galapagos
- the common ancestor was fully marine for millions of years between leaving the South American mainland and arriving at the Galapagos

54. During El Niño events in the Pacific, which of the following statements is TRUE?

- primary production in the ocean increases because of the warmer temperatures
- primary production on the islands decreases because of increased rainfall
- marine iguanas tend to go hungry and finches with smaller beaks tend to have higher fitness than their large-beaked conspecifics
- large marine iguanas tend to have higher fitness than small marine iguanas and small-beaked finches tend to go hungry
- marine iguanas and finches all do better than in non-El Niño years because of the increased precipitation

55. During cellular respiration, most eukaryotes use sugars as electron \_\_\_\_\_ and oxygen as an electron \_\_\_\_\_.

- donors, acceptor
- acceptors, donor
- consumers, fixer
- two of the above
- none of the above